The Strategic Relevance of the Revolution in Military Affairs to Australia

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> The "knowledge edge" involves exploitation of information technologies and decision systems to maximise the effectiveness of our relatively small ADF.
>
> Dr. Allan Hawke,
> Secretary of
> Defence

Australian defence thinking is undergoing an important change. It recognises that, if Australia is to fight and win in the combat environment of the twenty-first century, it must have a decisive advantage. That advantage will no longer lie in the sophistication of its military platforms compared with those in its region of direct strategic interest but - so official policy proclaims - it will rest with 'the knowledge edge'. What is meant by this term? Does it provide credible guidance for the future force structure? Is Australia putting too much emphasis on this idea and risking some of its more traditional force structure advantages? How comprehensive is the concept of "the knowledge edge" as a force structure priority? Can it form the basis for the Australian Defence Force (ADF)'s operational doctrine? And what are its implications for the organisation, structure and educational standards of the ADF?

This paper is not concerned with describing the technological characteristics of the Revolution in Military Affairs, which are well known. Rather, it focuses on the defence policy issues of what is important, and what is unimportant, in planning the

ADF for the next one or two decades. It begins by examining what has been said in the public domain about "the knowledge edge". Is it a satisfactory definition? How are the knowledge edge and the so-called 'revolution in military affairs' related? Do they differ? Next, it analyses Australia's future strategic environment and regional technological trends to determine the relevance of the knowledge edge. What levels of conflict, and intensity of military operations, will Australia credibly face? The final section describes the operational and organisational changes that will be required to make the knowledge edge effective.

This paper is part of a longer study by the author into the revolution in military affairs and security in the Asia-Pacific region.[1] Contrary to the expectations of some theorists, the revolution in military affairs will not equalise power among states in this region. Instead, the RMA will make relatively good progress in some countries (Japan, Taiwan, Singapore and Australia), in several others (such as China and India) there will be hybrid systems, but most of the countries in Southeast Asia will make little, if any, progress in this area of military technology and its application. All of the countries in the region, including its closest allies, will fall increasingly behind the United States in the high-end application of the RMA. This will have important implications for future alliance coalition operations in the Asia-Pacific.

The Knowledge Edge and Australian Defence Planning

Australia has long sought to have a margin of military superiority over any credible regional threat. But, in this context, invasion has been judged to be incredible. Less serious military contingencies, involving direct threat to Australia or its

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1 See Paul Dibb, 'The Revolution in Military Affairs and Asian Security', *Survival*, Vol.39, No.4, Winter 1997-98, pp.93-116.

vital interests, have been at the core of Australian defence planning for more than two decades. The Howard government's defence policy, which was announced in December 2000, focuses on the defence of Australia and the immediate region.[2] Forces structured on this basis would have limited relevance for allied operations in high intensity combat in Northeast Asia. In all these potential situations, it is recognised that Australia could not afford to take heavy casualties in combat or lose substantial numbers of platforms. The small size of its population base and the demanding nature of Australia's geography, have placed a premium on having a small but potent defence force on regional standards.

Ever since the late 1970s, at least, defence planners in Canberra have recognised that Australia's traditional advantage - in terms of the sophistication of the ADF's platforms - was being eroded. The 1976 Defence White Paper stated that Australia should use 'suitably high technology' in its weapons systems, equipment, training and support and should aim to maintain its 'present relatively favourable position, and be prepared to increase selectively the technological level' of its forces.[3] This was done, for example, by the decision to replace Australia's Mirage fighters with F/A-18s in the 1980s.

The 1987 Defence White Paper gave priority to the concept of defence in depth and observed that in many cases 'the ability to apply advanced technology effectively provides the only real solution to many aspects of defending our vast continent and

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2 *Defence 2000: Our Future Defence Force* (Defence Publishing Service, Canberra, 2000).

3 *Australian Defence*, White Paper presented by the Minister for Defence the Hon. D.J. Killen to Parliament (Australian Government Publishing Service, Canberra, 1976), p.14.

our interests in surrounding maritime areas'.[4] It went on, however, to note that this did not always imply the acquisition of the most advanced 'state-of-the art' equipment: Australia, it was argued, should favour advanced technology where it confers an operational advantage, reduces manpower or life-cycle costs, avoids early obsolescence or the need for additional equipment, simplifies operation and support, or where it is otherwise particularly suited to Australia's strategic circumstances.[5] The White Paper warned that the cost-effective use of technology requires specialist expertise to discriminate between alternative technological options, to modify equipment and in some circumstances to develop indigenous equipment.[6]

The 1987 Defence White Paper acknowledged that there are some important Australian defence requirements not readily met by systems available overseas. For the first time, the indigenous development of intelligence, surveillance and sensor equipment, together with associated command and control systems, was identified as a priority.[7] This led to priority being given, for instance, to the indigenous development of long-range over-the-horizon radar. But the White Paper failed to give clear guidance when it came to force structure priorities. Thus, whilst intelligence and surveillance were given the first priority for the ADF and its development, command, control and communications came last and there was little attention to the details of how Australia was to retain a technological advantage

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4 *The Defence of Australia*, a Policy Information Paper presented to Parliament by the Hon. K.C. Beazley (Australian Government Publishing Service, Canberra, 1987), p.31.

5 ibid., p.69.

6 ibid.

7 ibid., p.70.

as distinct from having superior combat aircraft, submarines, surface ships and battlefield helicopters.[8]

The 1994 Defence White Paper focused heavily on what was then perceived as the formidable economic growth of Asia and what this implied for the technological capabilities and military potential of the region and for the scale and intensity of combat which could be sustained against Australia.[9] It was foreshadowed that the range of military options available to many regional nations would grow quite quickly.[10] And, as a result, the planning and development of Australia's defence effort would need to take account of the increased capabilities which could be brought to bear against Australia.[11] This focus on capabilities rather than threats enabled the ADF to give priority to the demands of so-called short-warning conflict, as capabilities in the region increased. Planning was based on the judgement that increasing military capabilities in the region would be maintained, and may accelerate. In particular, 'the greater accuracy and lethality of weapons systems demands greater attention to stealth, deception and self-defence capabilities, particularly of key assets' [12] It was noted that the range at which engagements can occur is increasing, that the demand for accurate and timely information is becoming greater, and that effective command and control of force elements will be necessary for survivability (and that the vulnerability of essential command and control systems to countermeasures is increasing).[13]

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8 ibid , pp.34-64.

9 *Defending Australia,* Defence White Paper 1994 (Australian Government Publishing Service, Canberra, 1994), p.9.

10 ibid.

11 ibid., p.17.

12 ibid., p.25.

13 ibid.

The 1994 Defence White Paper stressed that, because of these developments, Australia could no longer sustain a technological edge over the full range of capabilities that could be brought to bear against it. Therefore, the ADF would have to become more selective about identifying those areas in which it needed to maintain a decisive lead and give priority to them.[14] Among the key areas where excellence needed to be developed, and which were needed to give Australia a 'decisive edge where it counts most', were:[15]

- intelligence, evaluation and distribution;
- surveillance and reconnaissance;
- command and control;
- key weapons and sensors; and
- electronic warfare.

In particular, command, control and communications were seen as areas in which Australia needed to maintain a high degree of excellence.[16]

The military trends identified in the 1994 Defence White Paper with regard to potential regional capabilities were emphasised even more in the then new government's 1997 defence policy document, *Australia's Strategic Policy*.[17] Maintaining Australia's relative strategic standing is seen in this document as 'an historic challenge' because of the growing economic strength of regional countries and the expectation that this

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14 ibid., p.27.

15 ibid.

16 ibid., p.34.

17 *Australia's Strategic Policy*. (Australian Government Publishing Service, Canberra, 1997). This policy document is not described as a White Paper.

would give rise to strongly growing defence budgets and greatly improved military capabilities.[18] As in the 1994 Defence White Paper, these trends were seen as having an impact on the scale and intensity of combat which could be sustained by regional forces, which would widen the range of military options available to them.

This was seen as significant for Australia's force planning and gave rise to an important change in force structure priorities. Greater emphasis is given in the 1997 defence policy document to defeating attacks in Australia's maritime approaches and less emphasis is given to defeating attacks on land.[19] More priority is given to strike and amphibious operations and air power is given much greater emphasis. All this reflected a different strategic approach by the Howard government (which sees forward regional military operations as more likely), but it also shows serious concern about technological developments in the region and the capacity of putative adversaries to operate with greater combat intensity in Australia's neighbourhood. Hence, combat aircraft, submarines and surface combatants (in that order), supported by well-developed intelligence, surveillance and command and control systems, were seen as Australia's first line of defence and its highest priority.[20]

The December 2000 Defence White Paper was an apparently radical departure from previous Australian Government policy statements. The experience--for the first time in Australia's history--of having to lead, at very short notice, a U.N. sanctioned intervention force in East Timor made the Government reassess the need for larger and more ready ground forces. As a result, this latest White Paper gives priority to land

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18 ibid., p.16.

19 ibid., pp.43-4.

20 ibid., p.45.

forces that can respond to any credible armed lodgement on Australian territory and provide forces for more likely types of operation in its immediate neighbourhood. Nevertheless, air combat power is identified as "the most important single capability for the defence of Australia, because control of the air over our territory and maritime approaches is critical to all other types of operation in the defence of Australia "21 Maritime forces are the next priority because of their ability to deny an opponent the use of Australia's maritime approaches and allow Australia the freedom to operate at sea itself. Strike comes third because it provides Australia with the flexibility to destroy hostile forces before they are launched towards Australia and when they may be most vulnerable. It is strange that, presentationally at least, what is described as "information capability" comes last in the White Paper's Defence Capability Plan. Even so, effective use of information is described as being "at the heart of Australia's defence capability"22. It is further argued that by focussing on information capabilities as a separate capability grouping it will ensure they receive the priority they deserve. This grouping in the White Paper includes intelligence and surveillance capabilities, communications, information warfare, command and headquarters systems, and logistics and e-business applications.

But while there has been some progress in such areas as fusing real time intelligence and surveillance data, the same cannot be said for the development of a single, co-located command and control headquarters for the three Single Services. There have also been technical problems in developing a workable command and control system at a reasonable cost. Moreover, the new White Paper's emphasis on ground forces, together with important decisions to be made in the next five years on very

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21 *Defence 2000: Our Future Defence Force*, op. cit, pp. 84-5.

22 ibid, p. 94.

expensive replacements for the F/A-18s and the acquisition of AAW destroyers, risk sidelining the previous emphasis on the "knowledge edge".

The Knowledge Edge and the RMA

Which brings us to the concept of the so-called 'knowledge edge'. This term, which was first used in public in the 1997 defence policy document, *Australia's Strategic Policy*, is meant to be different from the American concept of the revolution in military affairs (RMA). The US concept of the RMA, which Admiral Bill Owens and Joseph Nye have described as 'the system of systems',[23] is an extremely high-technology, expensive and comprehensive approach to modern warfare. It was demonstrated, but in a fairly basic way, in the 1991 Gulf War and more recently in the NATO bombing campaign against Serbia. The expectation is that both the technologies of the RMA and the concepts of using precision, real-time weapons will continue to improve.

But it needs to be understood clearly that the US concept of the RMA is not necessarily entirely relevant to Australia's strategic circumstances, even as a scaled-down version. Every Australian defence planner needs to remember that there are limits to Australia's defence capability and that marching down the American RMA path, except in a highly focused and discerning way, will lead to a force structure that is too ambitious and too expensive. As usual in defence planning, it all comes down to affordable priorities.

Australian defence policy recognises these challenges by referring to the need to set benchmarks based on the military capabilities likely to exist in the region over the next 15 years, as a reasonable guide to the types of military capabilities

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23 See Joseph S. Nye and William A. Owens, 'America's Information Edge', *Foreign Affairs*, Vol.75, No.2, March/April 1996, pp.20-36.

Australia should be able to counter.[24] The traditional assumption that Australia's forces will have an automatic technological edge over others in the region is no longer plausible. Individual platforms and weapon systems will now need to be carefully assessed against the leading regional capabilities likely to be operational over the next 15 years or so.

Australia cannot expect to be the leader in everything: for example, Australia does not need to excel in heavy armoured warfare if it does not expect to operate in that environment, either in the north of Australia or overseas. *Australia's Strategic Policy* identifies two priority areas where Australia needs to prevail:

- having the capability to deny our sea and air approaches to any credible regional force; and
- maintaining a strong regional presence as a maritime power.[25]

In both of these areas the key to maintaining an Australian military superiority is having better intelligence, surveillance and command and control arrangements.

Australia's Strategic Policy in fact gives the highest priority to these three force elements. It identifies Australia's ability to use and manage information technology as one of the areas where Australia can maintain and aspire to continuing excellence.[26] My own research shows that, compared with other countries in the Asia-Pacific region (except the United States), Australia can aspire to excellence not only in these areas but also in systems integration and software skills and integrated logistic support

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24 *Australia's Strategic Policy*, p.47.

25 ibid.

26 ibid., p.55.

(ILS).[27] These are two little-understood but crucial areas if a country is to succeed in the RMA. And, in general, the Asia-Pacific region is highly deficient in these skills: to excel in systems integration and ILS, regional countries will have to encourage a much more challenging and innovative approach to defence development. In Japan and Singapore there seems to be some recognition of this fact, although there are deep-seated social (and political) factors resisting the kind of radical change that is needed. This is reflected in their inability to be innovative in the civilian information technology revolution (compare Japan and Singapore in this regard with Sweden and Finland).

One of the major policy problems for Australia is that as America's closest ally, and the country in the Asia-Pacific with the most advanced military and educational skills in these key areas, it needs to keep up with the demands of interoperability with US forces. There is a balance here between the demands of interoperability with the U.S. and the priority task of the defence of Australia and its neighbourhood. The latter may not always be synonymous with the interests of the United States, as was demonstrated in the United Nations operation in East Timor where the U.S.--for understandable reasons--did not contribute infantry troops to the U.N. coalition led by Australia.

Australia's defence policy recognises that achieving the lower levels of interoperability with the United States can be relatively inexpensive and need have no direct influence on wider capability development decisions.[28] But this will only deliver a modest capacity to cooperate and it will limit the combined capability of cooperating forces. Close cooperation with the United States will require a wider range of communications

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27 See Dibb, 'The Revolution in Military Affairs and Asian Security', pp.101-4.

28 *Australia's Strategic Policy*, p.47.

links and, at the higher end of cooperative engagement concepts, common or compatible systems and platforms and shared logistic capabilities. Developing interoperability with US RMA-capable forces will be expensive, particularly in communications, sensors and signal processing. As combat capability is increasingly tied to continual real-time communication of intelligence, surveillance, command and control, the interoperability of these systems will become more important to achieving effective tactical cooperation, especially in air and naval forces.[29]

Britain is already finding it demanding and expensive to maintain interoperability with US forces, as the pace and complexity of US investment in such systems continues to grow. Although Australia is prepared to make significant investments to sustain interoperability with the United States as new systems are introduced, it is far from clear what this means for its own force characteristics. For example, how far should Australia go with upgrading its combat aircraft now (F/A-18s in particular) as distinct from taking a decision to replace them sooner than planned? How capable should be the upgrades for its surface fleet (FFGs and *Anzac* frigates) and how survivable will they be when operating with US forces in high-intensity theatres? Is it worth investing Australia's scarce defence dollars in current platforms, or should Australia wait a while and make a technological leap forward to a new generation of capabilities, incorporating stealth, long-distance cruise missiles, and unmanned aerial vehicles (UAVs)?

The Future Strategic Environment

Crucial decisions about Australia's force structure priorities will depend to a significant extent on assessments about its future

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29 ibid., p.48.

strategic environment out to about 2015. Obviously, there is a great deal that is unpredictable about looking forward through such long time frames. If, for example, we look back an equally long time -- to the mid 1980s -- we see a different world. At that time, Australia's strategic assessments were overwhelmingly concerned with the apparently relentless rise of the Soviet Union's military power. Official assessments were predicting that the USSR could well become a greater military power than the United States.[30] Australian defence planning was struggling with how to balance these questions of the apparent rise of Soviet global military power with the need - for the first time in its history - to develop independent concepts for the defence of Australia.

During this period of great global tension, it was apparent that Australia needed to contribute more to alliance burden-sharing by developing more modern forces and being able to contribute more effectively to the security of its own region. As already mentioned, there was a realisation that this would become more difficult as Australia's advantage in military platforms was being eroded. The need for a 'knowledge edge' can be traced back to that time of considerable strategic turbulence.

One of the key force planning tools that was used was to analyse the abiding nature of Australia's geography - particularly the vast geographical expanse of the north of the continent and the archipelago stretching down from Southeast Asia to the South Pacific - to see what characteristics it would generate in terms of the demands of range, endurance and

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30 These views were reflected in the Fraser government's pronouncements in the early 1980s and in official intelligence assessments, which were heavily dependent on U.S. sources.

mobility for the ADF.[31] Another planning tool was to concentrate more on generic regional capabilities than on specific threats or contingencies. Modern combat aircraft, surface combatants and submarines were being acquired by regional powers, together with more capable and longer range tactical missile systems. And it was envisaged - correctly - that this trend would continue, and probably accelerate, through the 1990s. A policy decision was made that Australia should seek to maintain an advantage in this area, where it was cost-effective.

The question arises whether a similar methodology can be used in terms of applying the knowledge edge through to 2015. The answer is that it probably can but that the task facing the ADF is going to be much harder. First, geography itself is changing under the impact of higher speed, more accurate missiles, which will effectively reduce the time taken to traverse and locate targets in Australia's northern approaches. Second, the ready availability of satellite photography with a resolution of one metre will enable any country to identify and classify military platforms. (Synthetic aperture radar will provide a less accurate picture but at night and through foliage.) These trends in satellite capabilities, together with the availability of long-range and high-altitude UAVs and advanced long-range radars (over-the-horizon radar (OTHR) and surface wave) will make Australia's land mass and maritime neighbourhood much more transparent than previously. Australia will still have a distinct advantage in key areas of intelligence, surveillance and reconnaissance but will not be so immune to regional capabilities in this regard as in the past. Its geography will become more compressed and more transparent, although the

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31 See *The Defence of Australia,* chapter 3 and Paul Dibb, *Review of Australia's Defence Capabilities,* Report to the Minister for Defence (Australian Government Publishing Service, Canberra, 1986).

vast approaches to its north will still provide crucial defence in depth, if it manages its responses effectively.[32]

One of the important elements in Australia's response will be to monitor key technological developments in regional military capabilities, so that it is not surprised when new capabilities are fielded. This will become more challenging as the region acquires more sophisticated capabilities (such as overhead satellites, supersonic cruise missiles, and ballistic missiles with chemical or biological warheads) and has much more ready access to foreign military technology.

One of the more disturbing trends in the post-Cold War era is the readiness of foreign military suppliers to transfer previously highly classified and high-performance military capabilities to any purchaser with financial means. It is, of course, still the case that the most sensitive military technologies are restricted for domestic use or for close allies, especially in the United States. But Russia in particular faces a desperate economic situation and arms exports will loom even larger as one of the few areas where it has a comparative advantage.

Already, we have seen the importation into the region of Russian supersonic cruise missiles and wake-homing torpedoes, as well as advanced beyond-visual-range (BVR) air-to-air missiles. In the future, technologies such as high-powered microwave weapons, offensive lasers, advanced submarine-detection technologies, phased-array and millimetre radars, as well as ballistic missile technologies, will probably be exported from Russia. Over the next decade, the United States and its allies will have to meet this Russian challenge in the region,

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32 For an outline of Australia's future technological requirements, see *The Knowledge-Based Battle Field* (Science Policy Development Branch, Defence Science and Technology Organisation, Canberra, 1997).

which already involves substantial arms transfers of advanced weapons to China.

For Australia, maintaining its access to weapons systems from the United States, the United Kingdom, and key European suppliers will remain vital to developing its knowledge edge. In the past, Australia has not had ready access to the source codes that would enable it to change the performance characteristics of weapons purchased, even from its closest allies. All that will have to change if the self-reliance aspect of the so-called knowledge edge is to have any meaning at all. Building up Australia's own defence industry capabilities in this key area, in cooperation with the Defence Science and Technology Organisation (DSTO), should be a clearly identified strategic priority.

The most difficult challenge, however, in analysing the future strategic environment is identifying the range of credible outcomes facing Australian defence planners out to 2015. Strategic history over the last decade should have taught us not to rely on comfortable, straight-line extrapolations of past experience. The collapse of the USSR and the Warsaw Pact and the Asian economic crisis (as well as the removal of the Suharto regime in Indonesia) suggest that Australian defence planners need to encourage a greater diversity in forecasting the future.[33] Predicting a single strategic future - which Australia has tended to do in the past - is no longer acceptable. This must not be an excuse, of course, for speculative, worst-case scenarios.

Part of the knowledge edge, in my view, should lie in Australia's more skilful strategic analysis and relating its assessments about credible alternative futures to what these could mean for its force structure priorities. Performing the

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33 In fact, some excellent work is being done by the Department of Defence in analysing alternative futures.

latter with the same sort of intellectual rigour as has been applied over the last 20 years to determining force structure priorities for the defence of Australia will not be easy. The reasons for this are simple: the number of possible permutations for force structure options rises directly in proportion to the number of regional scenarios, the intensity of conflicts considered credible, and the different geographical and operational conditions pertaining in each case. Having said that, the realities of limited resources and the small size of the ADF will discipline those who dream about aircraft carriers and expeditionary forces for high-level conflict in distant theatres.

None of this is to argue that Australia's strategic circumstances will always remain stable. Possibilities exist for the disintegration of Indonesia (which is the fourth largest country in the world), as well as for a radical shift in the balance of power in Northeast Asia.[34] Australia cannot merely plan on a benign strategic outlook, where cataclysmic events never occur. Even a peaceful and stable region may not necessarily be in Australia's defence interests if, for example, it means domination by a regional hegemon or the withdrawal of forward-based U.S. forces. As Donald Kagan has observed: perceiving the source of a new war in a time of peace is a difficult task.[35] A stable international order has yet to be built in Asia: who is to argue that the power of nationalism based on linguistic and ethnic xenophobia will not destroy the peace here as it has done elsewhere in the world? Unexpected changes in the balance of power have occurred throughout recorded

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34 See M.S. Dobbs-Higginson, *Asia-Pacific: Its Role in the New World Disorder* (William Heinemann, Melbourne, 1993); Kent E. Calder, *Asia's Deadly Triangle* (Nicholas Brealy, London, 1996); and Paul Dibb, *Towards a New Balance of Power in Asia*, Adelphi Paper No.295 (Oxford University Press for the International Institute for Strategic Studies, Oxford, 1995).

35 Donald Kagan, *On the Origins of War* (Doubleday, New York, 1995), p.567.

history: conflict between the major powers in Asia may be hard to conceive but not incredible.

This is not the place to analyse such speculative scenarios. It is sufficient for our purpose to note their relevance to Australian defence planning and the knowledge edge. I do not accept the sort of overly optimistic view of the future that is reflected in the argument that there has been a paradigm shift in international affairs, which foresees that low-level conflict and terrorism have replaced major war as the defence planning tool of the future.[36] Lawrence Freedman argues that a 'revolution in strategic affairs' has taken place in which major powers appear less likely to go to war with one another than they are to intervene in conflicts involving weak states, militia groups, drug cartels and terrorists. Freedman concludes that the RMA may be less suited to conflicts such as these.[37] In fact, of course, RMA-type capabilities in such areas as situational awareness and precision attack do have relevance for military operations other than war - not least by reducing collateral damage. But the more important point is that Freedman's narrowness of strategic vision overlooks the fact that major war could well occur in Asia - for example in Korea and across the Taiwan Strait - in which the United States and its allies would almost certainly use RMA warfighting capabilities and cooperative engagement concepts (CECs). Moreover, for a regional middle power, such as Australia, the knowledge edge offers precisely the sort of military advantage that most regional countries lack - and will continue to lack.[38] The fact that Australia is America's

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36 See Martin van Creveld, *The Transformation of War* (The Free Press, New York, 1991).

37 Lawrence Freedman, *The Revolution in Strategic Affairs,* Adelphi Paper No.318 (Oxford University Press for the International Institute for Strategic Studies, Oxford, 1998), pp.73-8.

38 See Dibb, 'The Revolution in Military Affairs and Asian Security', pp.104-11.

closest ally in the Asia-Pacific region, and that the most sensitive intelligence and surveillance elements of the RMA will not be widely disseminated outside the inner-alliance, only strengthen this argument.[39]

Where Freedman has an important point - to which Australian defence planners need to give more attention - is the prospect of a regional adversary, which is not RMA-capable, resorting to such asymmetric responses as chemical and biological warfare and the use of ballistic missiles.[40] One methodology that could be used here is to consider non-standard contingencies and so determine where ADF force responses might be deficient.[41] In this context Australia will continue to monitor U.S. developments in ballistic missile defences and to provide detection and tracking information through the joint U.S.-Australian intelligence facilities that are located in Central Australia.

Organisational Change and Operational Imperatives

So far, we have considered the nature of the knowledge edge and the relevance of its technologies for Australia. The previous section suggested that an integral element of the knowledge edge requires giving more careful attention to analysis of Australia's future strategic environment. Australia must not be caught by surprise by having inadequate forces for the regional tasks that lie ahead. Given the pace of recovery of

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39 For a powerful insight into the problems for small powers in achieving security without an alliance policy, see Robert L. Rothstein, *Alliances and Small Powers* (Columbia University Press, New York, 1968).

40 Freedman, *The Revolution in Strategic Affairs*, chapter 3.

41 See Richard L. Kugler 'Nonstandard Contingencies for Defense Planning' in Paul K. Davis (ed.), *New Challenges for Defense Planning: Rethinking How Much Is Enough* (RAND, Santa Monica Ca, 1994), pp.165-96.

the region economically,[42] and therefore of regional military capabilities, Australia needs to be careful not to proceed with upgrades to existing platforms now that could be leapfrogged technologically by burgeoning regional capabilities in 2015.

Naturally, considerable attention is being given at present to acquiring the enabling technologies for the knowledge edge.[43] Expenditure in these key areas (including command and control systems, communications, intelligence and surveillance systems, electronic warfare projects and a range of new, smart weapons), is planned to be relatively large: about 30-35 per cent of future investment. This excludes platform upgrades for combat aircraft, surface combatants and submarines. It is difficult, therefore, to place a precise figure on the costs of the knowledge edge in terms of equipment, hardware, sensors and software. The fact is that the so-called knowledge edge will account for a varying slice of most future ADF acquisition programmes and should be seen as a 'whole of ADF' operational output.

The other key area that is difficult to quantify with any precision is how much the knowledge edge is costing, not just in information systems but in reorganising and training the ADF. For example, the creation of key positions such as Commander Australian Theatre (COMAST), and other operational commands such as Northern Command (NORCOM) based in Darwin, are designed not only to improve unified command authority but also to quicken decision making. Similarly, the creation of the new Imagery and Geospatial Organisation and

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42 *Asia-Pacific Profiles* (Financial Times and Asian Pacific Economics Group, Singapore, 1998), p.35 predicts that in a decade's time East Asia will be back close to the growth trajectory of the past two decades.

43 See Ken Anderson and Paul Dibb, *Strategic Guidelines for Enabling Research and Development to Support Australian Defence*, Canberra Papers on Strategy and Defence No.115 (Strategic and Defence Studies Centre, Australian National University, Canberra, 1996).

the Joint Intelligence Support Environment project are designed to improve the intelligence analysis and advice cycle, which will feed into the ADF Joint Command Support Environment Project.[44]

There will have to be some trial and error. The ADF already ranks as the most jointly operated force in the region: it has a clear advantage here. But a new area of focus is how also to achieve superiority in the military and political decision-making cycles. The knowledge edge will provide real-time information and precision in military operations but this will be to no avail if appropriate, timely decisions are not taken. The knowledge edge is critical to attaining decision superiority: a concept that has been termed 'knowledge operations'.[45] Knowledge operations depend on two main concepts: the availability of accurate, timely information and the ability to make appropriate decisions quicker than the decision-making cycle of the adversary. This in turn can be enhanced by a range of knowledge-management mechanisms, including training, simulation, technical reforms (for example, integrated logistic support) and organisational reforms (such as joint force headquarters). Knowledge operations require not only information superiority in the command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) areas but also an advantage in information operations. The latter involves protecting sensitive Australian defence information and also the ability to influence

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44 JCSE seeks to develop a command support system (CSS) to assist with the collection, processing, storage, retrieval and display of information for the ADF command. It will provide the necessary analytical tools, databases, maps, displays, communications and office automation in a secure operating environment.

45 I am indebted to the Chief Knowledge Officer, Air Vice Marshal Peter Nicholson, for these thoughts.

or deny the adversary's information (what are sometimes termed offensive information operations).[46]

This implies that knowledge operations will need to extend to Australia's overall national capabilities (not just those of the ADF), including the national crisis management machinery: decision superiority in the military/defence area will need to be paralleled by decision superiority at the national strategic level. What will have to be avoided, however, is any temptation for politicians to reach down into military operational decisions. The tendency will be there - given the availability of real-time information and the transparency of the theatre of operations - for politicians (and bureaucrats) to run the tactical battle.

Which brings us to the associated issue of organisational hierarchies. Military structures are traditionally highly hierarchical and conservative: there is a recognised chain of command and authority. The ability of the ADF's hierarchical structure to respond to a technology that relies on networking is perhaps a bigger challenge than absorbing the technology.[47] Networking of forces will permit dispersed yet integrated operations with excellent situational awareness: the current 'tokens' of defence capability (divisions, aircraft squadrons, the surface fleet) are rapidly becoming less relevant, while globally netted command, control and communications and globally netted reconnaissance, surveillance, tracking and acquisition of targets are becoming dominant factors in capability.[48]

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46 See AVM Peter Nicholson, *Controlling Australia's Information Environment or Decision Superiority and War-Fighting* (Air Power Studies Centre, Canberra, 1998), pp.9-13.

47 ibid., p.20.

48 Paul K. Davis, David C. Gompert, Richard J. Hillestad and Stuart Johnson, *Transforming the Force: Suggestions for DoD Strategy* (RAND, Santa Monica Ca, 1998), p.2.

Traditional views of lines of command will need to be rethought as Australia moves into knowledge operations:

> The new structure of warfare integrates and synchronises redundant, multiservice warfighting systems in simultaneous attacks on the enemy throughout his entire depth and in the space above him as well. All of this means that in future conflict the three levels of war, as separate and distinct loci of command and functional responsibilities, will be spaced and timed out of existence.[49]

Australia must be careful, however, not to let the US preoccupation with the RMA drive our own force doctrine too far - although that will be difficult to avoid if coalition operations are seen to be a defence priority. Australia cannot afford to have two forces: an RMA-high force for coalition operations in high-intensity warfare and a knowledge operations force for the defence of Australia and lower level regional contingencies in Australia's more immediate neighbourhood.

In either case, however, there will have to be organisational change with flatter hierarchies and more responsibility given to operational commanders in the theatre, who will need to analyse real-time information and react quickly in compressed time scales. Headquarters staffs in Canberra will have access to the same data and will need to refrain from the temptation to micro-manage the battle. Equally, however, modern warfare will be rarely exempted from the need for firm political direction and sensitivity to targeting (a precision strike that misses a military target and creates civilian collateral damage is a case in point).

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49 Douglas MacGregor, 'Future Battle: The Emerging Levels of War', *Parameters* , Vol.22, No.4, Winter 1992-93, p.42.

Naval and air combat engagements may be harder to manage in this regard than those of land forces.[50]

In this modern, information age the education demands on officers and other ranks will increase. This may well have implications for the size and structure of reserve forces, especially as the military will be competing with the civilian sector for precisely those technically educated people who are in high demand for the knowledge edge. This should involve some more flexible employment arrangements between the industrial/commercial world and the ADF. Distinctions between the civilian and military sectors will become more blurred.

Operationally, the ADF will have to make sure that its current preoccupation with devising yet another new 'military doctrine', and its tendency to create new headquarters and theatre staffs, do not end up building the wrong sort of structures and hierarchies for fast-moving knowledge operations. An opponent that uses information and communications networks to coordinate dispersed activities, perhaps without any formal organisation or even central headquarters leadership, will deprive Australia of strike and decapitation attacks. Rather, the opposition may assume the role of fighting networks with 'swarms' of attacks coming in from different directions and with different forms of attack, rather than a direct offensive.[51] This approach to warfighting may well appeal to the strategic culture of some regional countries.

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50 Although, as Freedman points out, 'search and destroy' operations will become redundant if the enemy can be found electronically and destroyed from a distance (Freedman, *The Revolution in Strategic Affairs*, p.13).

51 John Arquilla and David Ronfeldt, *The Advent of Netwar* (RAND, Santa Monica Ca, 1996).

In Australia's case, a tension arises between the sort of higher intensity operational demands which are perhaps more likely in coalition operations at some distance from Australia and the prospect that for some considerable time to come its putative regional adversaries are more likely to operate in less conventional ways. Being highly knowledgeable about regional trends in this regard - which involves much more than just knowing about the characteristics of military platforms - is an essential part of the analytical knowledge edge.

The Need for a Holistic Approach

This paper has argued that Australian defence planning needs a more complete concept of the 'knowledge edge' than appears in the government's official documents. There, the knowledge edge is discussed in terms of intelligence, surveillance and command and control systems. These are certainly key elements for Australia's future force structure and they must be given appropriate emphasis compared with the ADF's more traditional concerns with acquiring new or replacement platforms. In Australia - as elsewhere - combat platforms will be retained in operational service for much longer and, as a result, there will be very substantial expenditure on upgrading them.[52]

We have argued here that as important as C^4ISR and sensor capabilities are to the ADF, they will not provide Australia with the advantage it seeks - even when accompanied by enhanced combat platforms - if a more overarching approach is not taken to the entire question of the knowledge edge. The knowledge edge for Australia must include organisational and operational changes that will be as revolutionary in their impact on the ADF

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52 The ADF is planning to spend some $5 billion on upgrading its combat aircraft, surface ships and other major platforms.

as the hardware and software demands of the RMA. This is, perhaps, obvious: but bringing about change in these areas against entrenched, conservative interests will not be easy.

Not so obvious is the need we have referred to for superiority in Australia's analytical capabilities in relating the demands of the future strategic environment to the knowledge edge, while doing this in a manner that is affordable.

We have also argued that Australia must have superiority in its decision making, both at the military operational level and at the national crisis-management level. This too will require important change. The new systems will bring with them the danger of information overload: information must not be confused with knowledge. And although the call will be, rightly, for flatter structures and more devolution of command authority, it must never be forgotten that war is a political act.

For Australia, as a middle power with limited defence capacity, there are a number of key policy issues to which this review of the knowledge edge has drawn attention. They include:

- Deciding which elements of the force structure need to advance the most into the higher realms of the knowledge edge. Obviously, this will include sophisticated sensors and advanced, secure communications, but what about decisions regarding the replacement of fighter aircraft and the survivability of surface combatants? Having a combat advantage means that the small ADF cannot afford to lose many platforms in conflict: therefore, the balance between upgrading and replacing is a tricky one for Australia's future force structure.

- The demands of interoperability and cooperative engagement concepts with the United States, at the higher end of the knowledge edge spectrum, compared with the

more modest requirements of the defence of Australia and neighbourhood contingencies, will also require careful management. (At the other extreme, interoperability with New Zealand may become increasingly questionable as Australia proceeds down the knowledge edge path.)

- By about 2010-15 there will be a severe conflict in resource demands between the need to replace a whole range of obsolescent ADF platforms (F/A-18s, F-111s, P-3C Orions, FFG-7s and - much earlier - DDGs and most army equipment) with what by then may well be rapidly increasing demands of keeping in front with the knowledge edge over a region that will be much stronger economically and technologically.

- Developing the organisational structures and operational concepts that will allow Australia to prevail in regional conflicts will be very demanding. There is a potential conflict of military management between command and control arrangements, which are hierarchical, and information transactions, which are best suited to networks. Attaining decision-making superiority will require a whole-of-government approach, as well as further progress in joint force and integrated departmental decision-making structures. This will not be easy.

- Australia will need better analytical techniques for knowing potential adversaries and playing to their weaknesses in knowledge operations. Nicholson observes that cognitive mapping of the opposition may well provide the ultimate knowledge edge.[53] Australia's analytical edge should enable it to identify its own critical

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53 Nicholson, *Controlling Australia's Information Environment …*, p.22.

weaknesses, as well as being able to benchmark the ADF more precisely against regional military capabilities.

- The need for sophisticated and well-focused analysis will become more demanding as the region becomes more disparate militarily. Some regional forces will be quite mundane in the sense that they will be equipped with conventional forces not dissimilar from today's. Others will have moved some way down the RMA/knowledge operations path but often with hybrid force structures that will challenge the ADF's targetting and tracking procedures. Yet others will have rejected the RMA path and will have focused on asymmetric responses, which will greatly complicate Australian defence planning and response mechanisms.

- Australia's defence procurement effort will have to become more integrated with the national effort as the ADF becomes more dependent on software specialists and systems integration engineers, and as the information technology innovation cycle becomes shorter than the defence procurement cycle. These trends suggest a greater use of commercial off-the-shelf technologies and a more imaginative use of reserve forces.

- The very complexity of Australia's future strategic environment and the range of contingencies to which governments may want to commit the ADF - ranging from lower level peacekeeping operations to mid- or even higher intensity conflict in cooperation with allies - suggest that Australian defence planners need to plan more for non-standard contingencies. This will demand the utmost attention to the allocation of scarce resources if Australia is to avoid falling into the trap of having an overly ambitious strategic concept and too few resources.

- A stepwise approach to the knowledge edge/knowledge operations might be needed across the spectrum of likely conflict (see Figure 1). What is implied here is that the knowledge edge will apply to the entire range of ADF operations and force structure planning, but that Australia - even with US assistance - cannot afford to be 'knowledge edge high' in everything it does. Neither, however, is it the case that the knowledge edge is of little relevance to low-level contingencies. Therefore, Australia needs to adapt its knowledge edge force across the spectrum of credible contingencies.

- It should be possible to re-engineer the ADF so that smaller units take on the functions that previously were accomplished by larger units (such as brigades taking on division functions). Other functions (such as running ships and submarines) should be possible with far fewer people.[54]

What all this suggests is that there is no one simplistic solution to Australia's knowledge edge requirements. Planning for the ADF of 2015 will require more consideration of a range of non-standard outcomes than in the past. A much more integrated approach to the knowledge edge, which embraces organisational change and operational doctrine, is also needed. This kind of adaptiveness in Australia's force planning will be far from easy, given the limited financial resources that are likely to be available.[55] But for Australia there is no choice: if it does not move down the knowledge edge path it risks having a defence

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54 Paul K. Davis, David Gompert and Richard Kugler, *Adaptiveness in National Defense:: The Basis of a New Framework* (RAND, Santa Monica Ca, 1996), p.11.

55 Australia's future defence expenditure, in current dollars, between 2001 and 2015 will amount to about $A200 billion, with about $100 billion on personnel, $45-50 billion on operations, and some $50 billion on capital acquisition.

force that will be increasingly vulnerable in the twenty-first century.

Conclusions

From an American policymaker's point of view, will Australia make rapid progress with the RMA? Will Australia, in this sense, be one of the few countries in the Asia-Pacific region that will be interoperable with the US? This paper has pointed to some of the difficulties for a medium-sized country such as Australia to forge ahead in the high-technology aspects of the RMA. The small size of the ADF and Australia's limited technological base are distinct hurdles. Although it is our judgment that Australia will make progress in what the Department of Defence calls "the knowledge edge", the ADF will struggle to be interoperable with the United States at the high end of the RMA. There is the further problem that even in the more limited context of "the knowledge edge" Single Service rivalries over the acquisition of expensive new platforms threaten to undermine the momentum that was envisaged four or five years ago.

Even so, it is important to understand that the Australian definition of the emerging RMA is not so closely focused on the technological dimensional of the revolution as in the United States. There is a general perception in Canberra that the US is focused far too heavily on technology and too little on the organisational reforms that are needed. Australia has put more effort into ensuring that the army, navy and air force operate more as a joint force than in the US. The creation of the Headquarters Australian Theatre and the Strategic Command in Canberra are examples of this, as is the creation in Defence Headquarters in Canberra of the Chief Knowledge Officer at two star rank. But the latter officer lacks the rank and power base to challenge the preoccupation of the Single Service Chiefs with platform acquisitions. The loss of momentum in these key

areas suggest that Australia will develop a hybrid force that is neither RMA high -- as in United States -- nor lacking the fundamental RMA characteristics which will prevail throughout much of Asia. In the areas of intelligence, surveillance and command and control Australia will be able over the next decade to operate a small but potent defence force. This will be sufficient to ensure that Australia maintains a margin of operational superiority over its immediate neighbourhood. The risks for Australia in failing to keep ahead in this key area are well understood in Canberra.

Australia's limited defence budget means that the transition to a "knowledge edge" ADF will not be easy. In particular, decisions in the next few years about the replacement for the F/A-18 combat fighter and new AAW. destroyers, as well as the more recent reallocation of funds to the army, threaten to undermine the resource priorities that will be required over the coming decade. What is required is a separate allocation of funds to "the knowledge edge" to be managed centrally at the three star level of the Vice Chief of the Defence Force. There is also cultural resistance to change but this may well improve as middle ranking officers at the Colonel or Brigadier equivalent level are promoted from a younger generation who have been brought up in an ADF that is much more "purple suited" and joint in its operational and organisational perspectives.

Figure 1: The Knowledge Edge and the Contingency Spectrum